Heat capacity measurements at the nanoscale

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Heat capacity is one of the fundamental properties of matter but at the same time one of the most difficult to measure with sufficient accuracy at the nanoscale. The difficulty rises exponentially with the reduction of the mass of the sample, being measurements in nm-thick materials extremely rare and challenging. Microfabricated membrane-based nanocalorimeters working in quasi-adiabatic conditions in ultrahigh vacuum are suitable probes to provide direct access to the heat capacity of the sample and unveil dimensionality effects on phase transitions. I will show several examples of nanocalorimetric-based measurements of phase transformations in nm thick materials. In particular, size effects in the ferro or antiferromagnetic transition of thin film magnetic materials [1,2] and the anomalous transformation of highly stable organic glasses into their supercooled liquid during thermal treatments [3,4].

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